

# ***Present and future (NCODA) assimilation in the near real-time Atlantic system***

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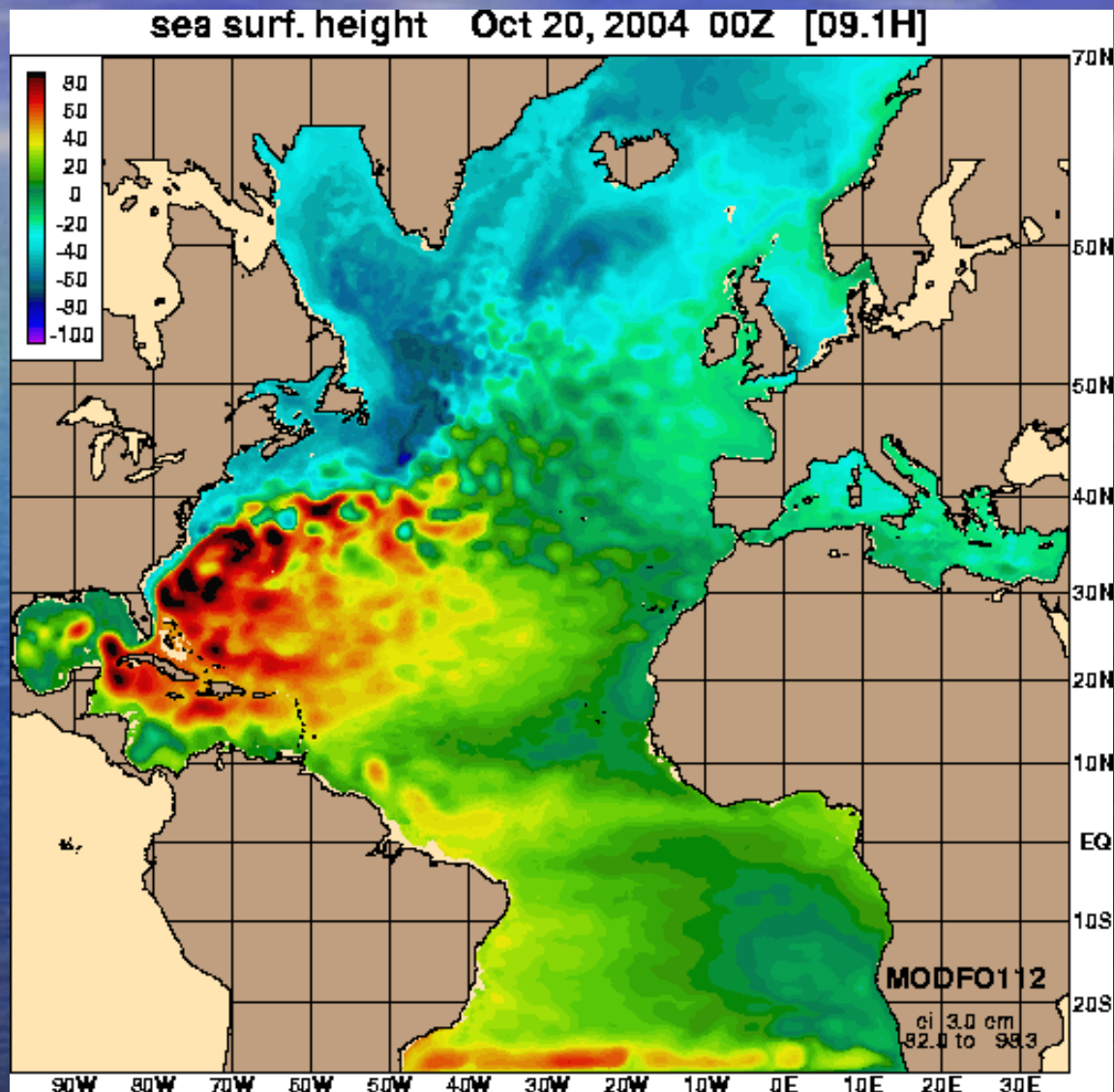
# ***Present system***

- **Running in near real-time**
  - . Assimilates the satellite altimeter analysis from the MODAS operational system at the Naval Oceanography Office (NAVOCEANO)
  - . Mean SSH from the 1/12° MICOM (ECMWF)
  - . Vertical projection via the Cooper and Haines technique (1996, JGR)
  - . FNMOC/NOGAPS atmospheric forcing
  - . Relaxation to the MODAS SST analysis
- **Automated scripts run the system from the preprocessing of the forcing fields to the post processing of the results**
- **Participating in the MERSEA model inter-comparison**

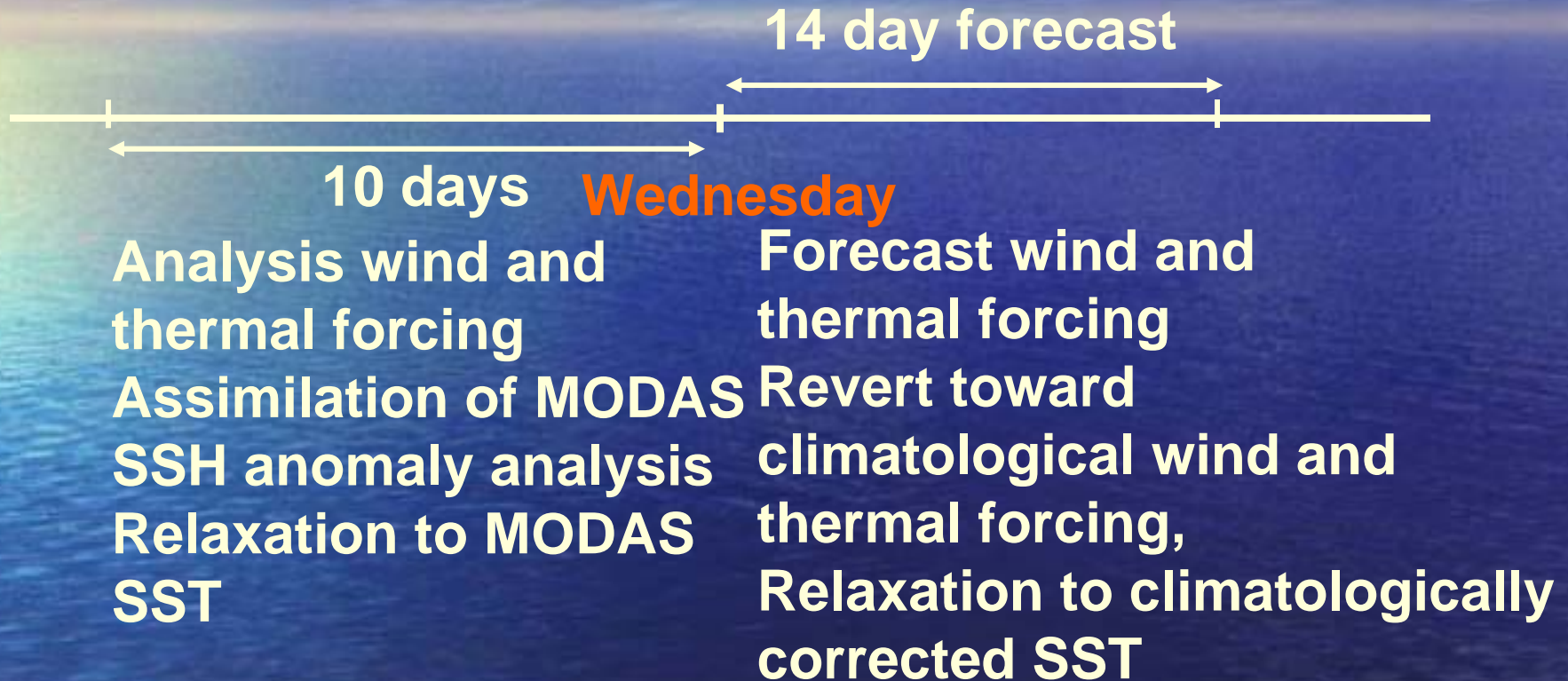


# 1/12° ATLANTIC HYCOM SSH

## 20 October, 2004



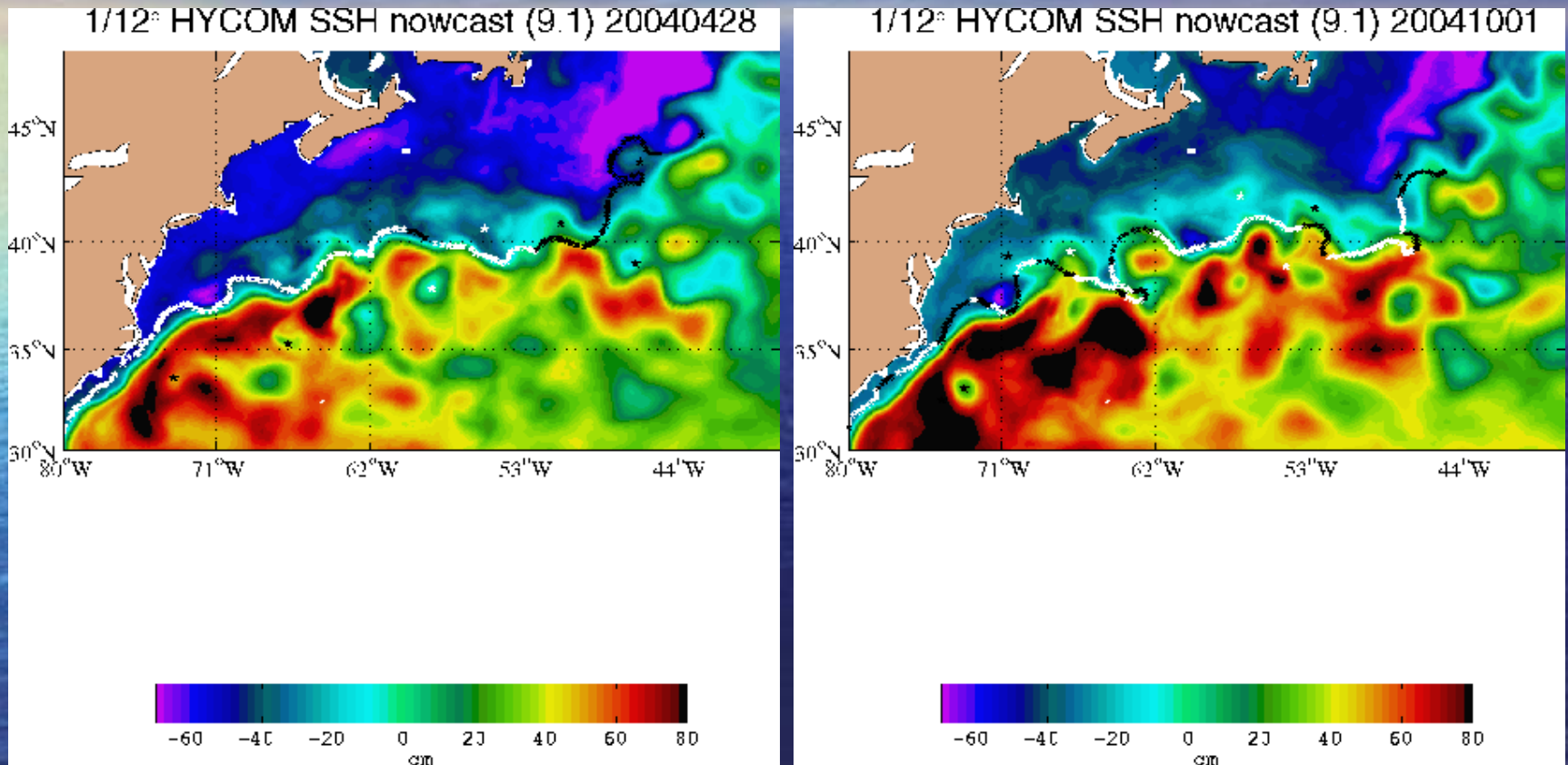
# *Near real-time system*



<http://hycom.rsmas.miami.edu>

# *1/12° Atlantic HYCOM*

## *SSH in Gulf Stream region*

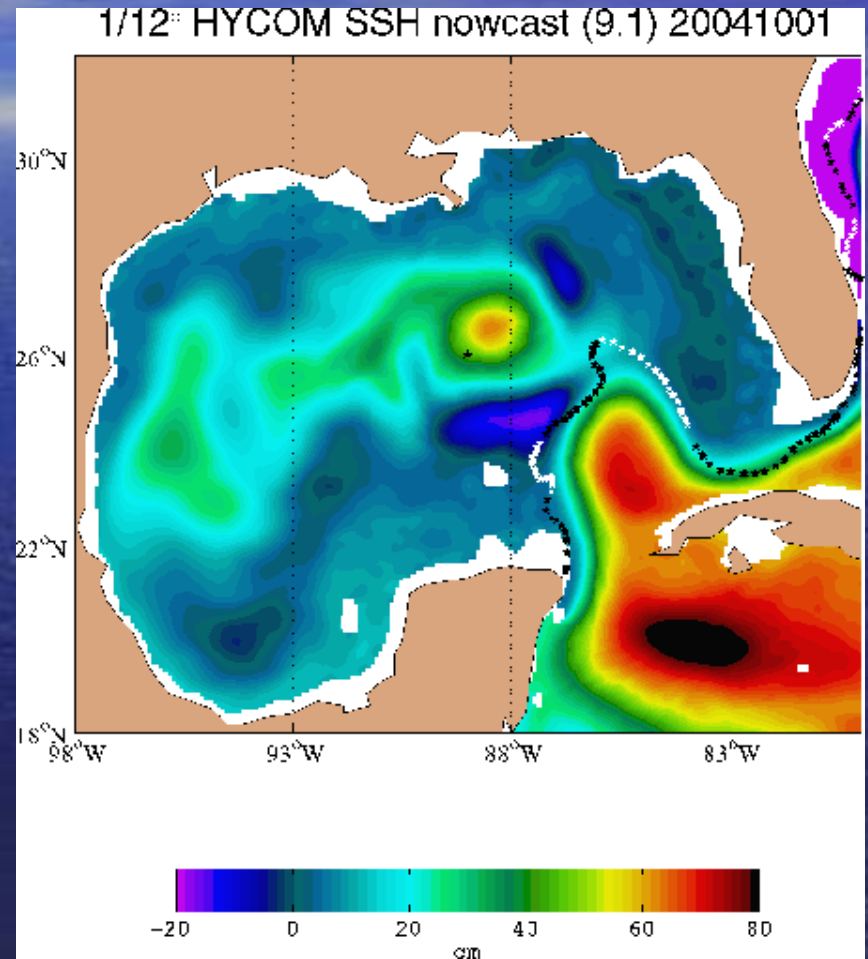
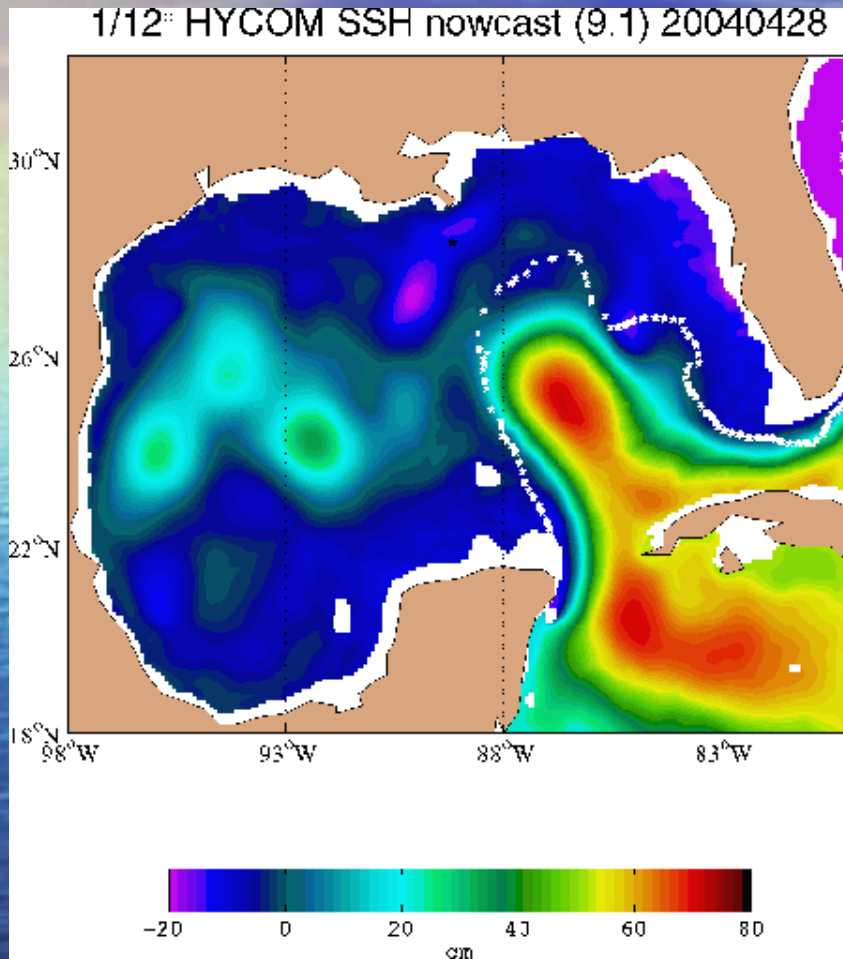


**White/black line is the frontal analysis of MCSST observations performed at NAVOCEANO. Black line represents data more than four days old.**



# *1/12° Atlantic HYCOM*

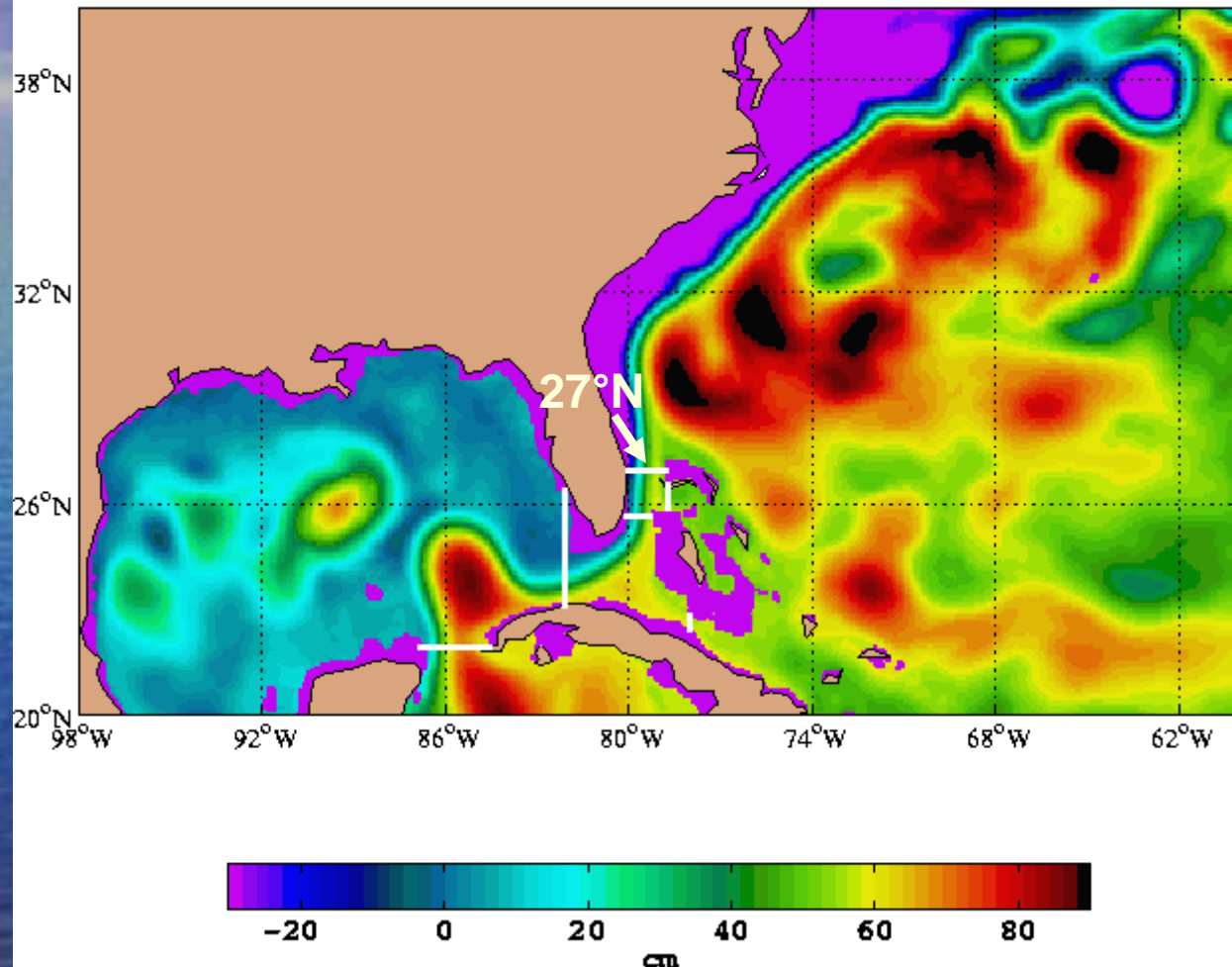
## *SSH in Gulf of Mexico region*



White/black line is the frontal analysis of MCSST observations performed at NAVOCEANO. Black line represents data more than four days old.

# *Transport sections*

1/12° HYCOM SSH nowcast 20041020

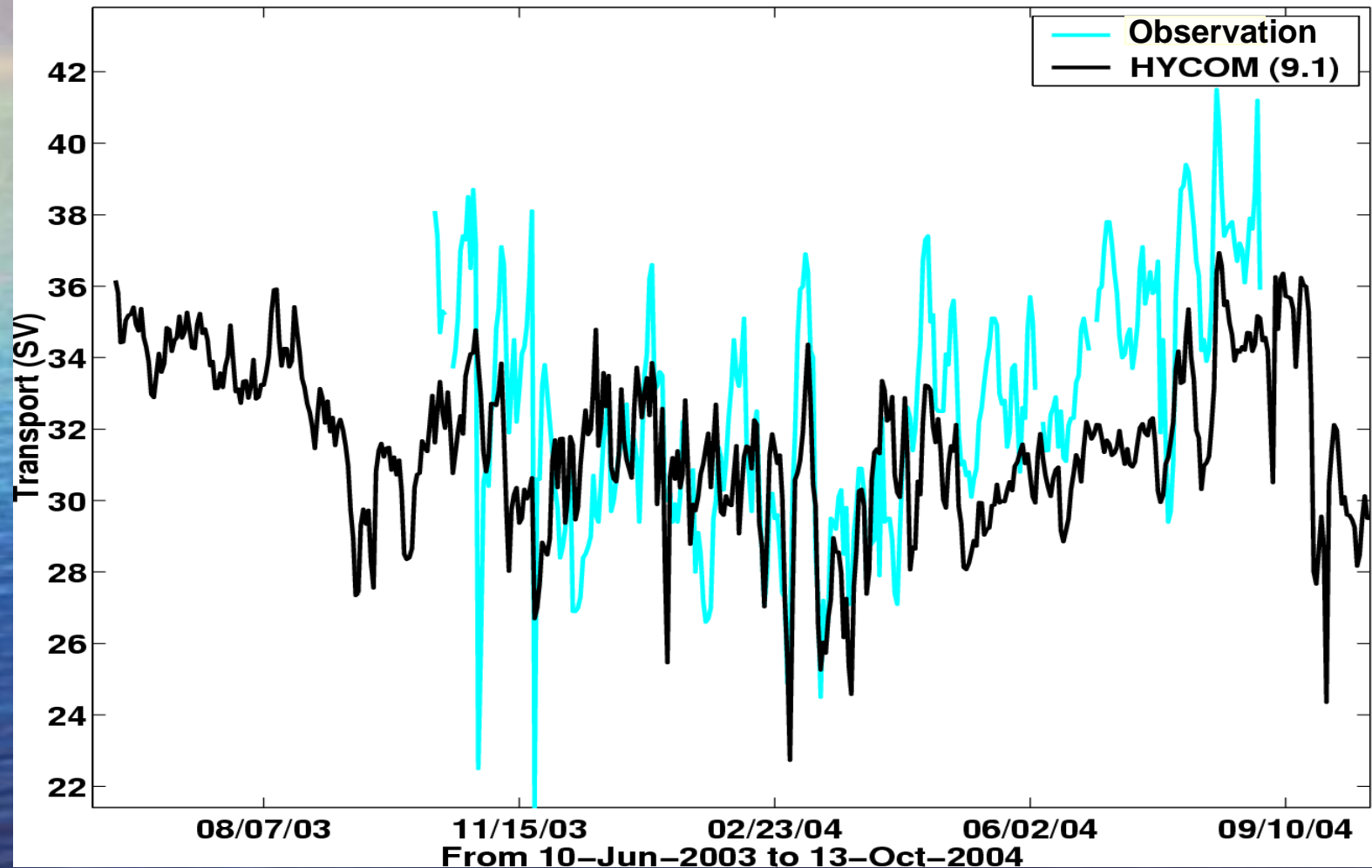




# *Florida Current transport at 27°N*

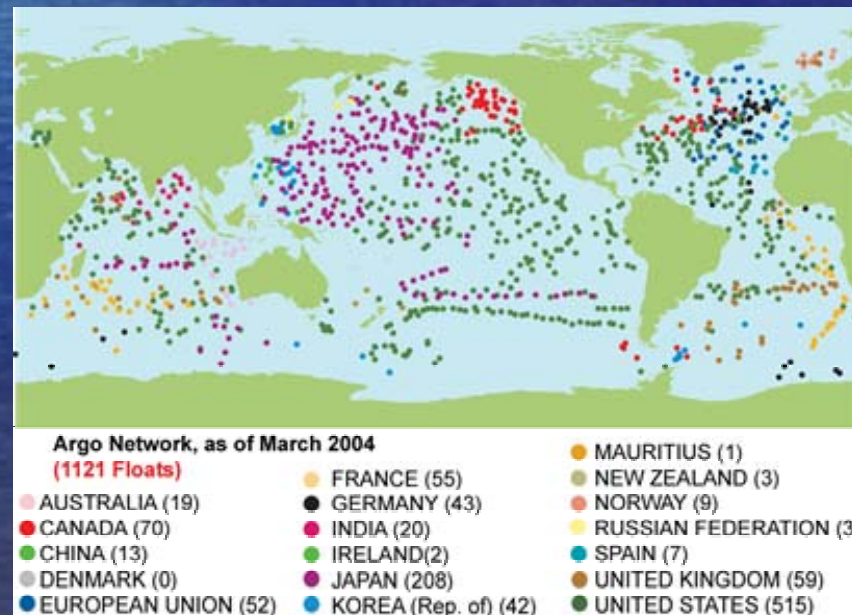
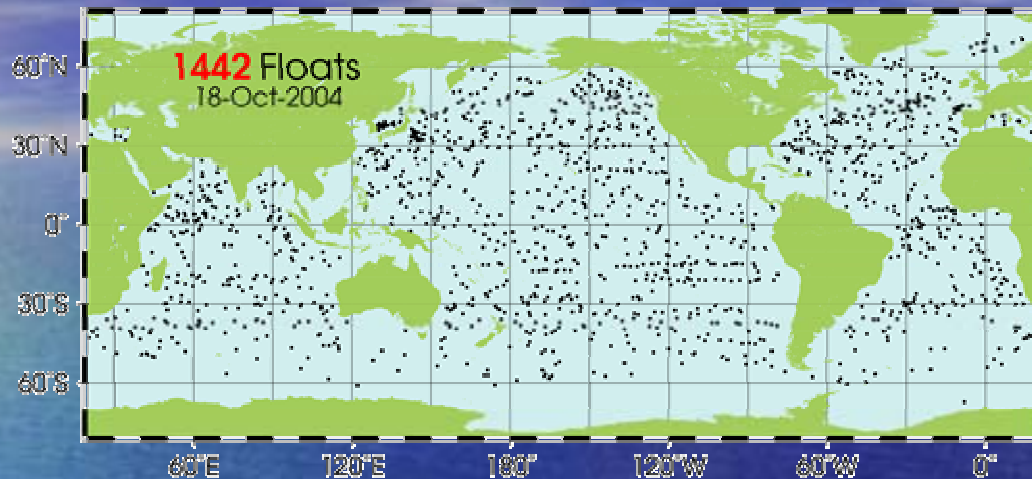
**HYCOM ATLd0.08–9.1–nowcast: STACS (80.08W–78.72W, 26.95N–26.95N)**

**Layer 1–26 Mean: 31.60 Min: 22.73 Max: 36.93 Std: 2.31 Corr: 0.60**

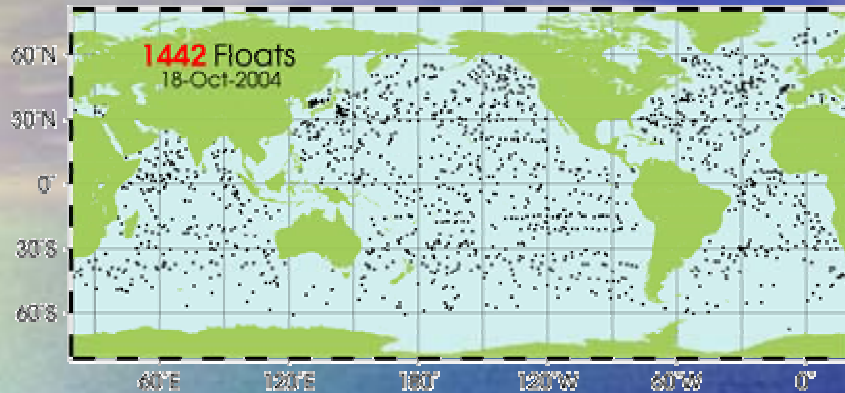


# ARGO profiles

<http://www.argo.ucsd.edu/>



# ARGO profiles

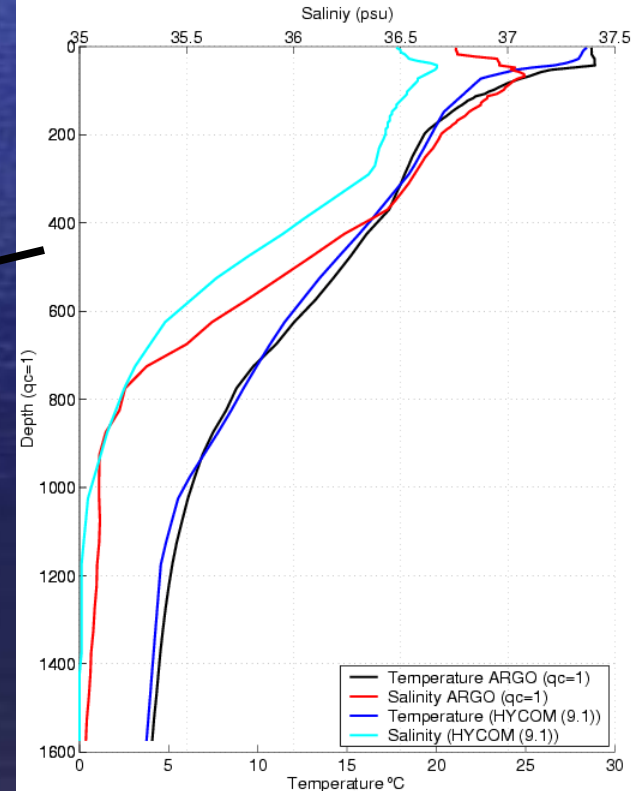
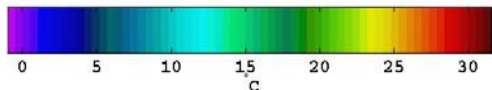
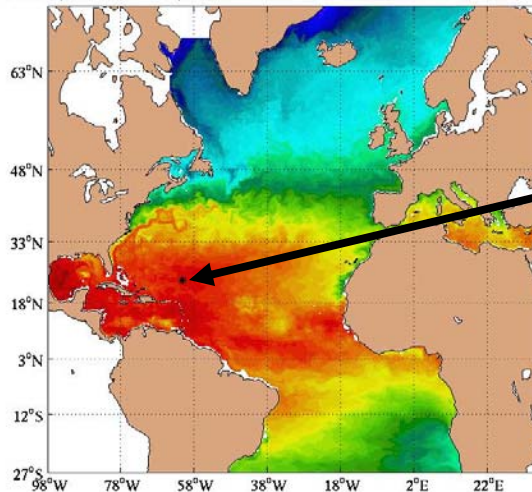


<http://www.argo.ucsd.edu/>

11 September 2004  
23.635°N, 61.148°W

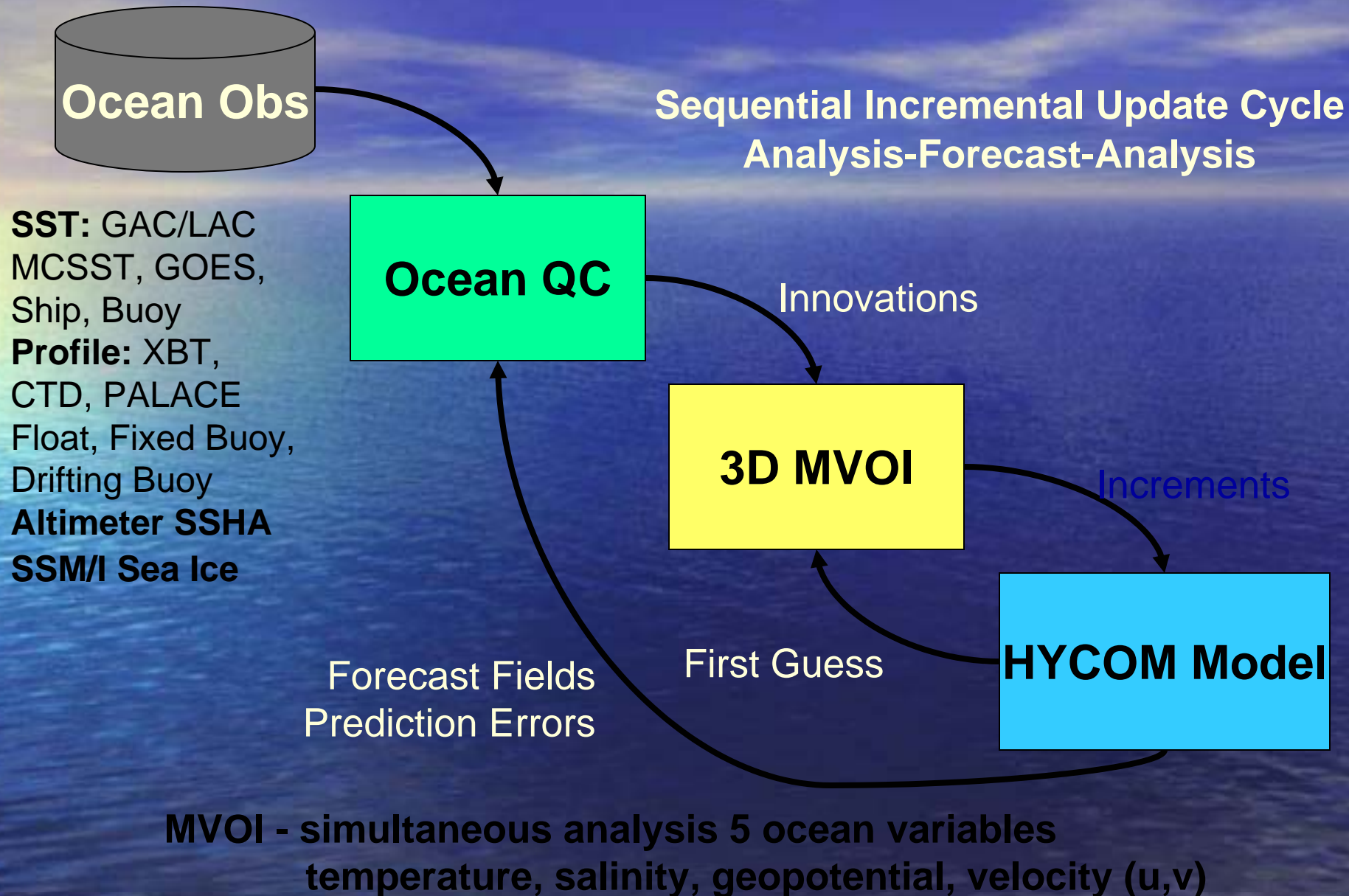
ARGO/HYCOM(9.1) (4900559) Date: 20040911 LAT: 23.635 Lon: -61.146

1/12° HYCOM SST 20040921 nowcast (9.1)  
ARGO positions for platform 4900559 from 20040911 to 20040921





# *NRL Coupled Ocean Data Assimilation (NCODA)*

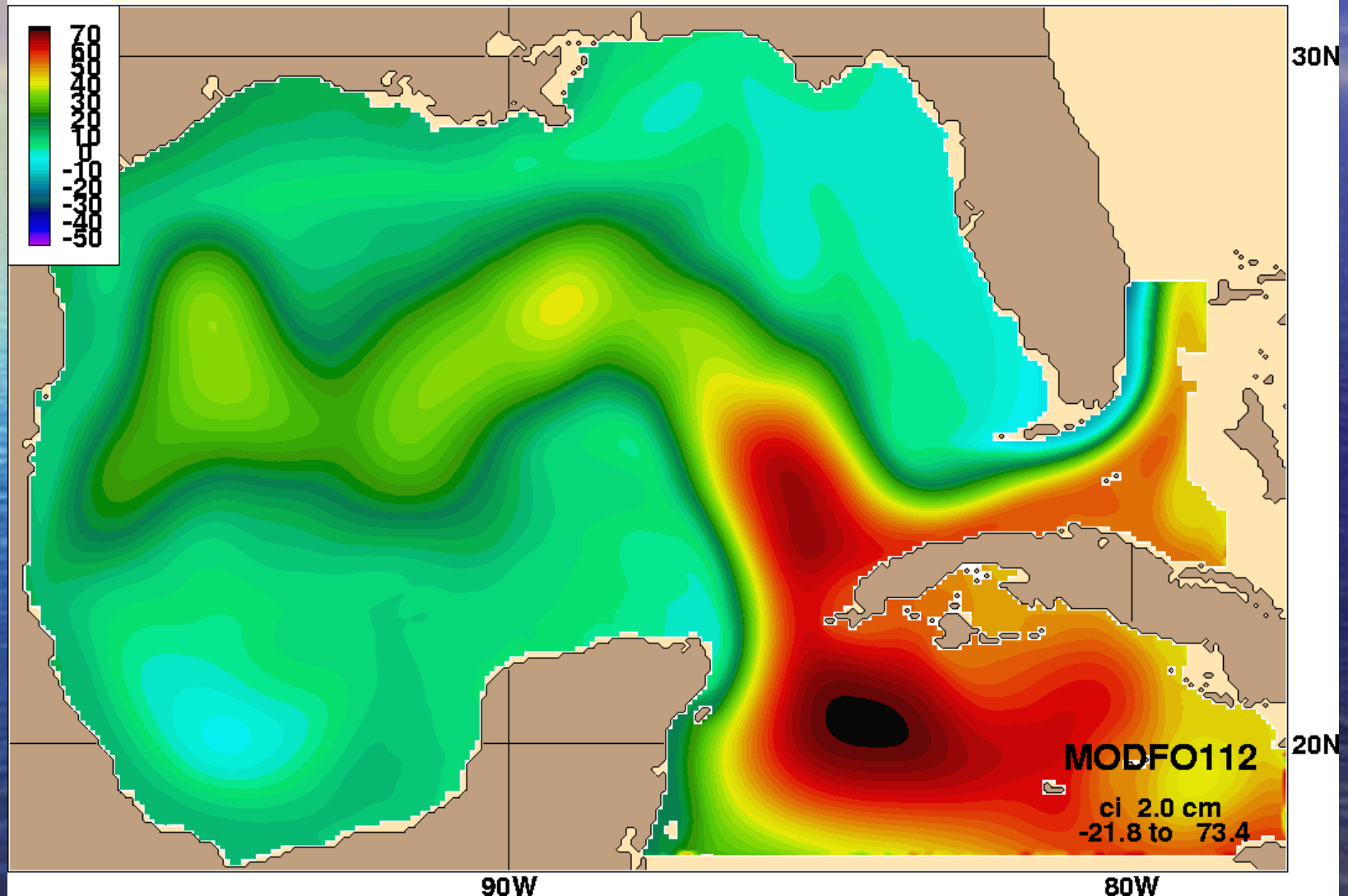


# ***GULF OF MEXICO MODEL CONFIGURATION***

- Horizontal grid:  $1/12^\circ$  (258 x 175 grid points, 6.5 km spacing on average)
- $18^\circ\text{N}$  to  $31^\circ\text{N}$
- 20 vertical coordinates
- Bathymetry: 5m coastline
- Surface forcing from FNMOC/NOGAPS
- Monthly river runoff
- Nested Boundary:  
relaxation to the  $1/12^\circ$  Atlantic HYCOM T and S, U and V along open boundary, (free running in these experiments)

# 1/12° GOM HYCOM MEAN SSH

September 1999 - June 2000





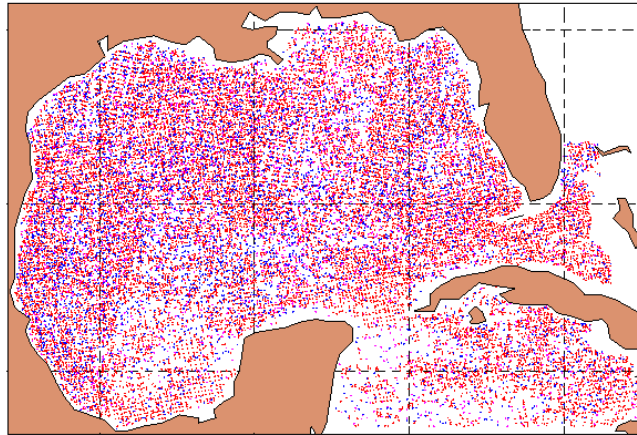
## ***Update HYCOM restart file***

- **NCODA 3D MVOI analysis on z-grid**
  - **total field and increments from the first guess (model forecast)**
- **Use total field and convert from z-space to HYCOM space when updating the restart file, (expt\_08.3)**
- **Use the increments to update T, S (and  $\rho$ ) in the restart file. Let hybgen move the interfaces, (expt\_08.4)**
- **A new analysis once a week in these experiments**

# NCODA observations, 17 May 2000

## Satellite SST

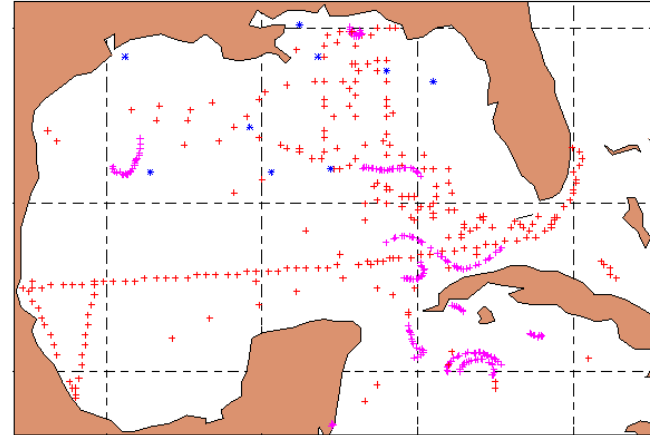
Satellite SST 17 May 00 00Z 9 km grid



GAC Day GAC Night GAC Rlx Day GOES Day GOES Night LAC Day LAC Night

## In situ SST

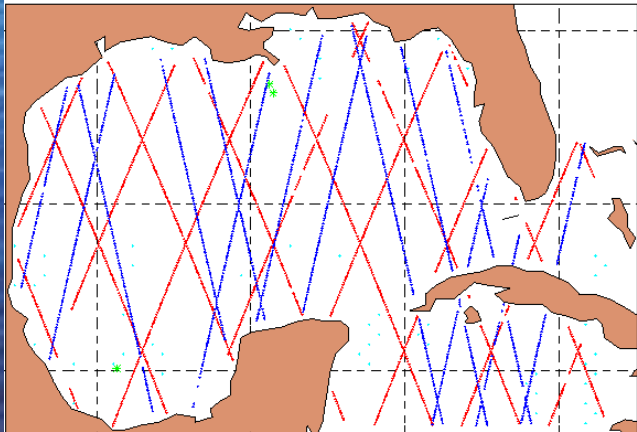
In Situ SST 17 May 00 00Z 9 km grid



Sfc Ship Fixed Buoy Drift Buoy Sea Ice SST Climate CMAN SST Analyzed SST

## Satellite altimetry

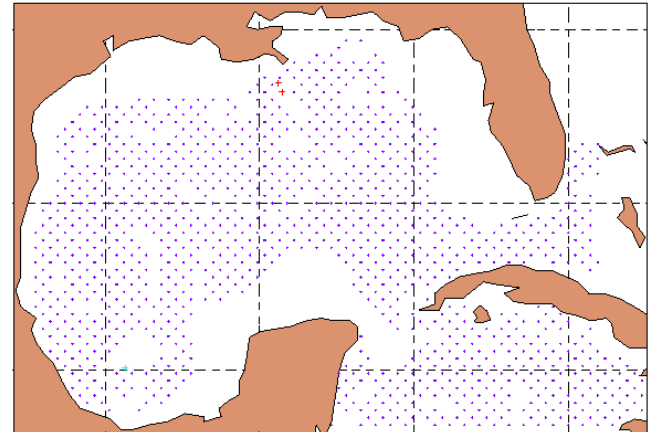
SSH Observations 17 May 00 00Z 9 km grid



Topex ERS2 GFO Jason Envisat In situ Suppl

## Profile "observations"

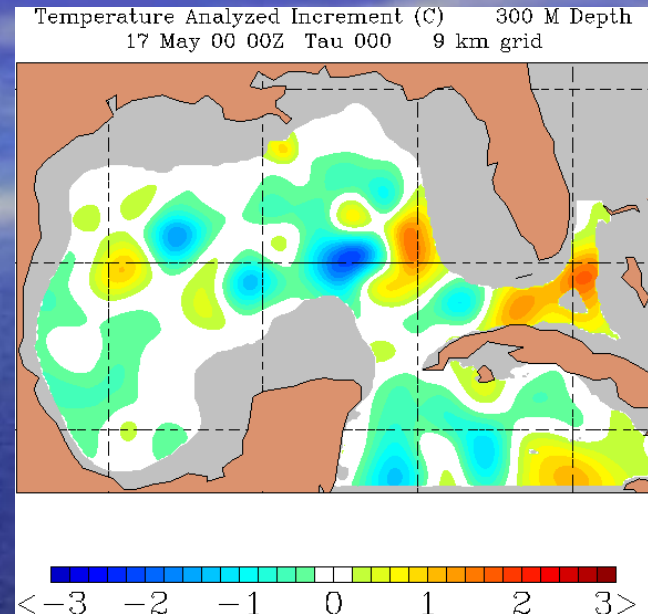
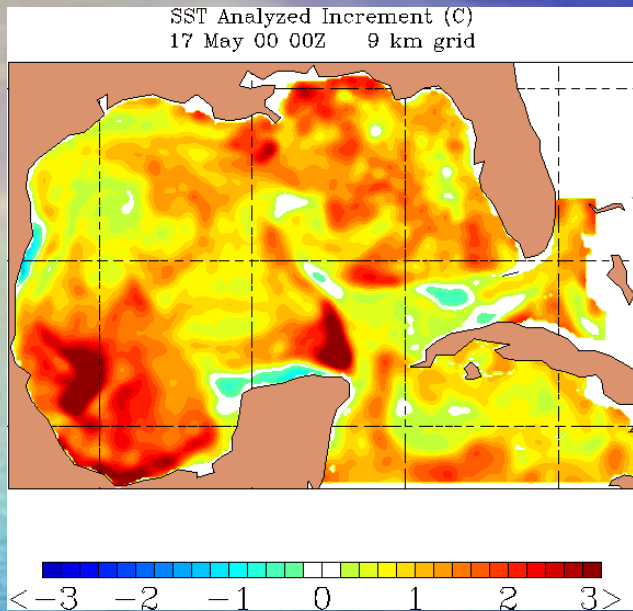
Profile Observations 17 May 00 00Z 9 km grid



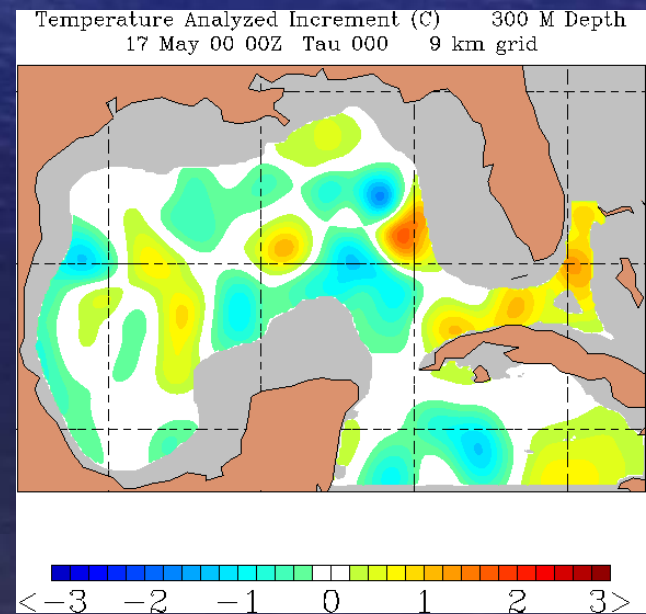
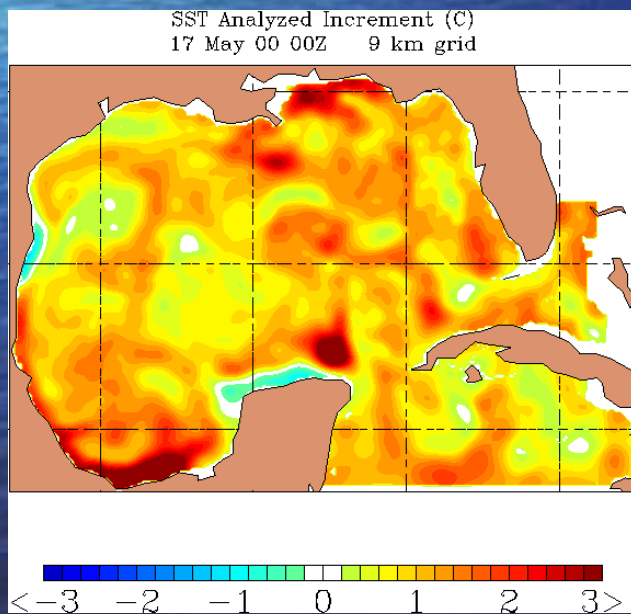
XBT TESAC PALACE Float Fixed Buoy Drifting Buoy MODAS Syn MODAS Suppl DIRECT Syn

# NCODA increments 17 May 2000

(08.3)

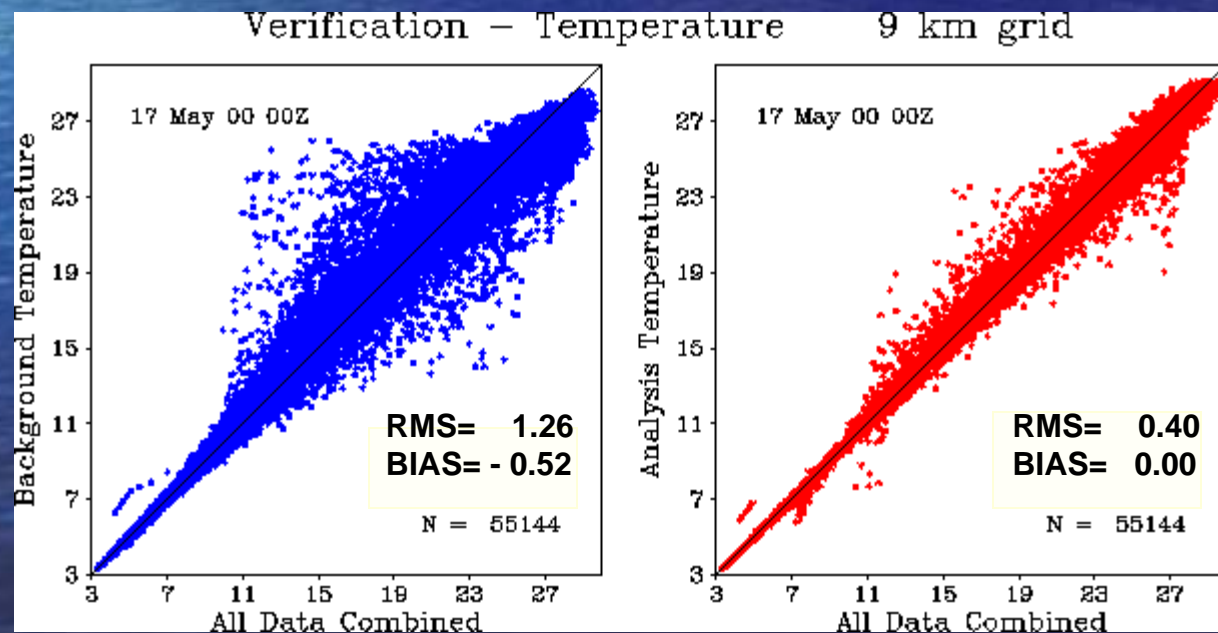
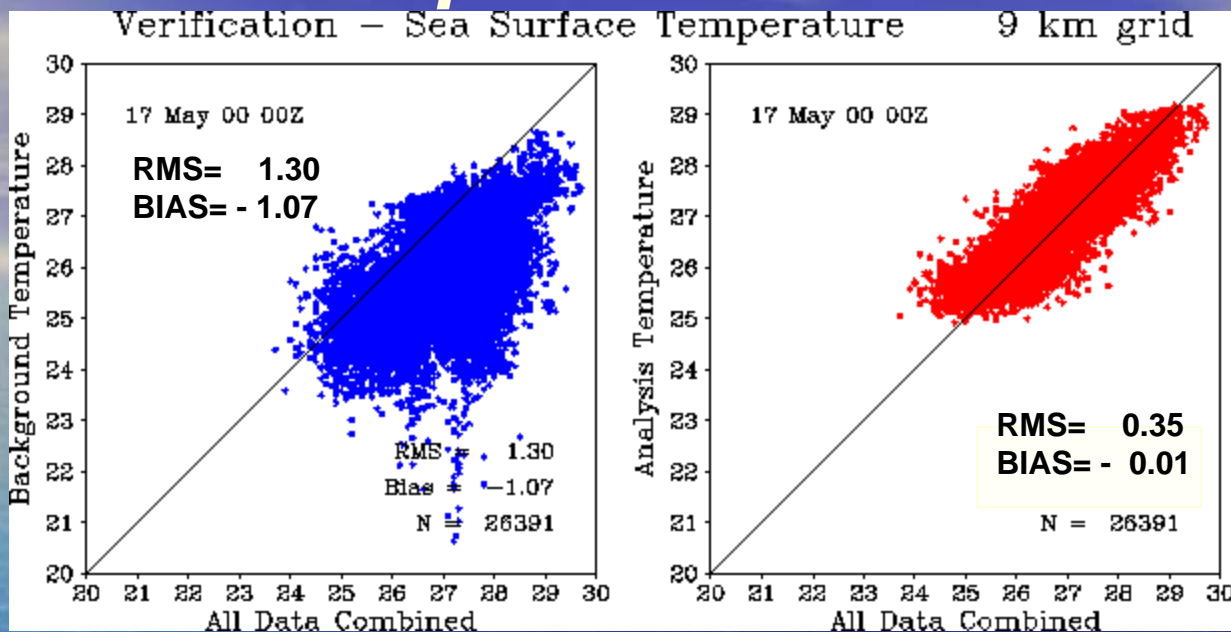


(08.4)

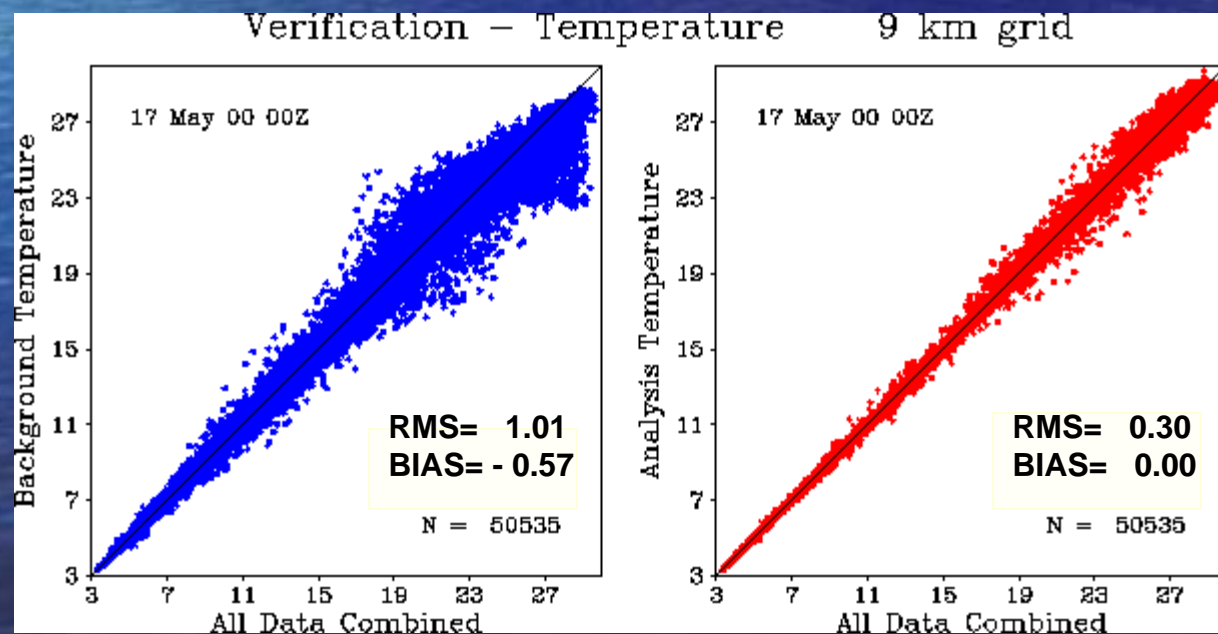
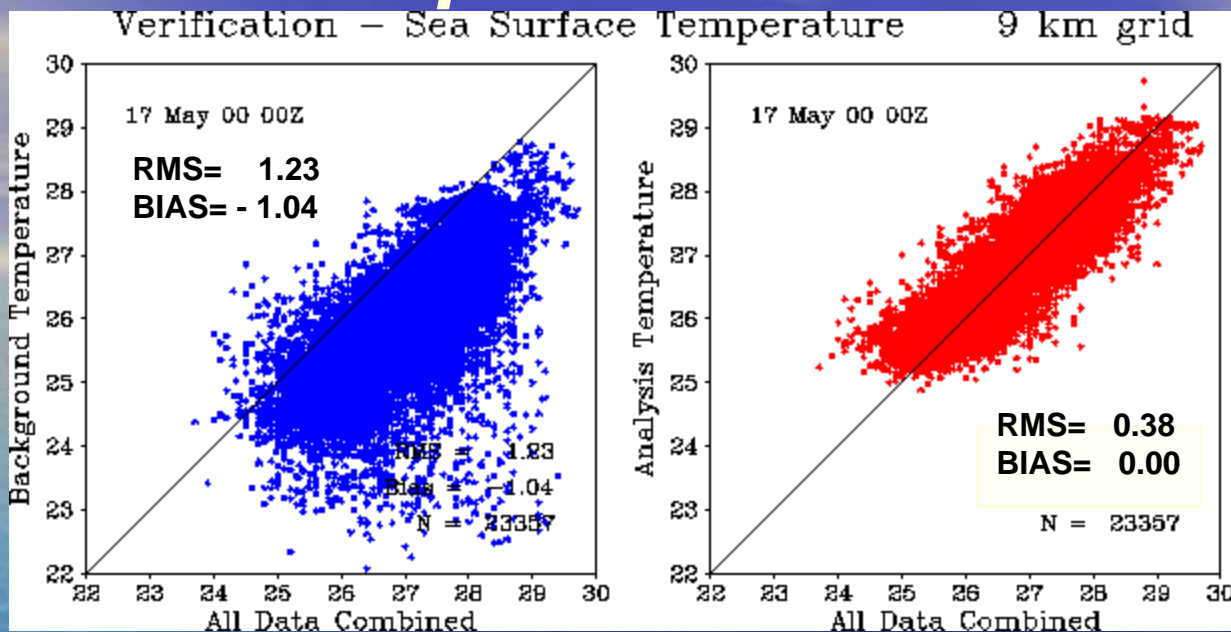




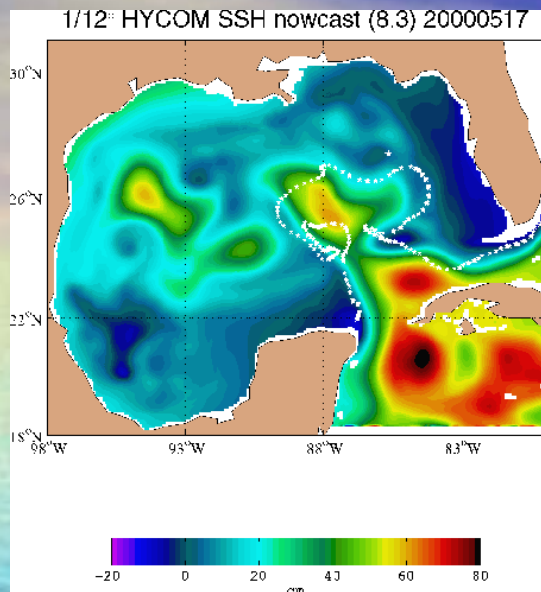
# NCODA Temperature verification (08.3)



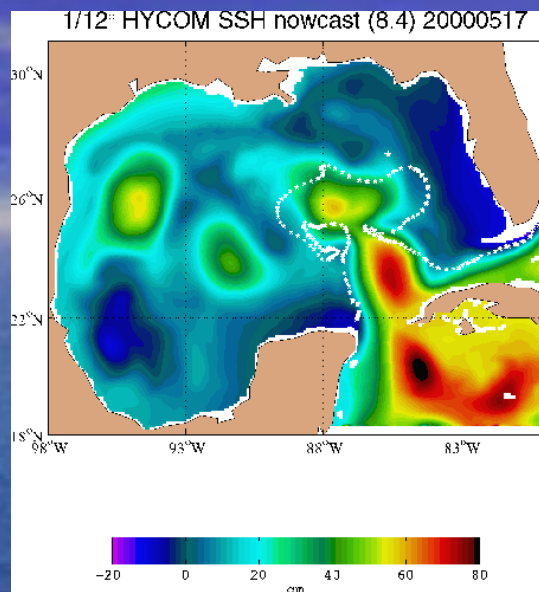
# NCODA Temperature verification (08.4)



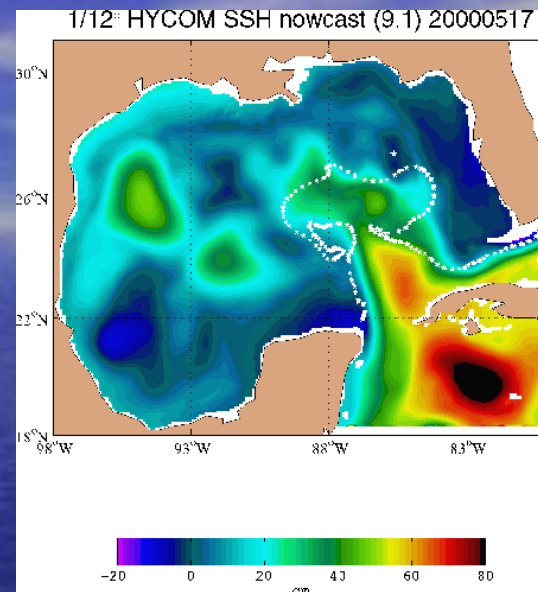
## NCODA (08.3)



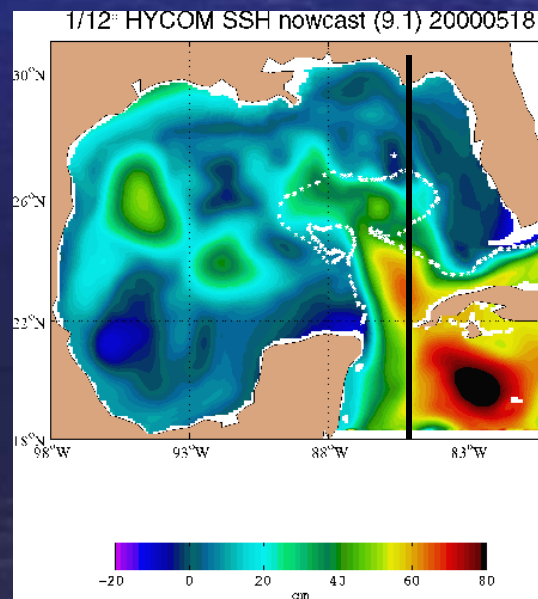
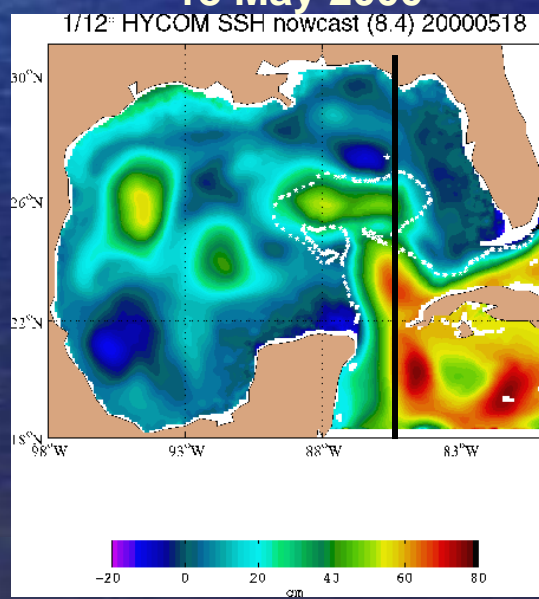
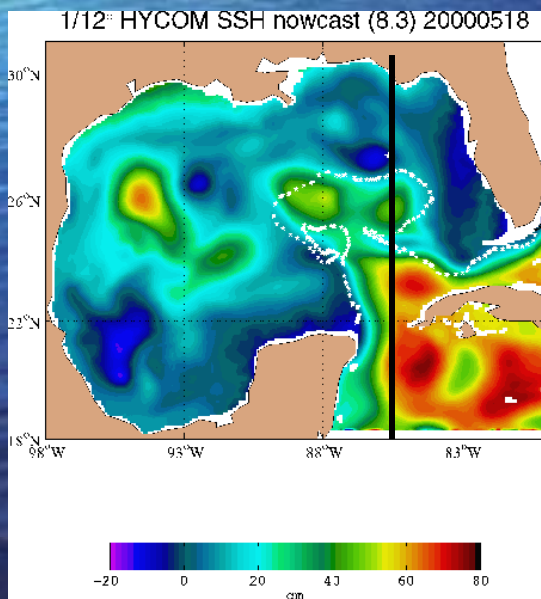
## NCODA (08.4) 17 May 2000



## Present assimilation



18 May 2000



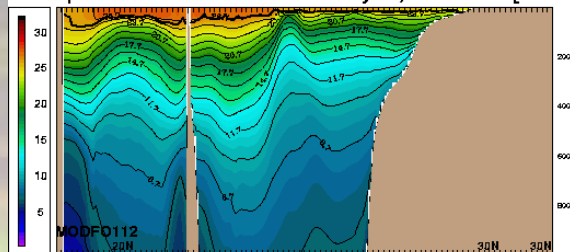


## NCODA (08.3)

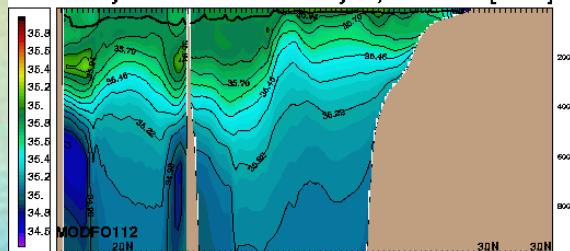
## NCODA (08.4)

## Present assimilation

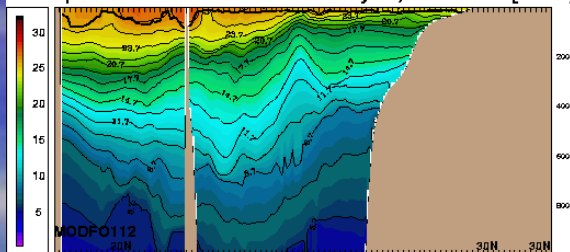
temperature merid.sec. 84.88w May 17, 2000 00Z [08.3H]



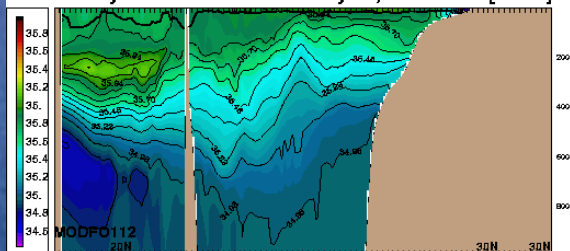
salinity merid.sec. 84.88w May 17, 2000 00Z [08.3H]



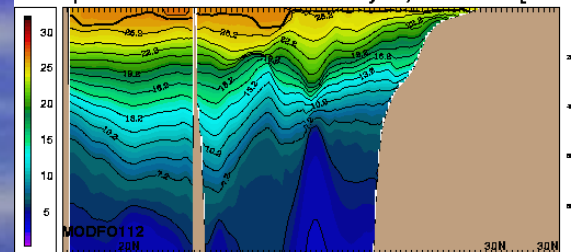
temperature merid.sec. 84.88w May 17, 2000 00Z [08.4H]



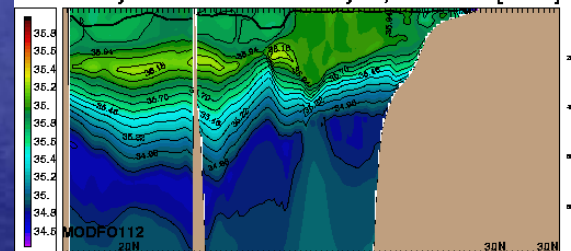
salinity merid.sec. 84.88w May 17, 2000 00Z [08.4H]



temperature merid.sec. 84.88w May 17, 2000 00Z [09.1H]

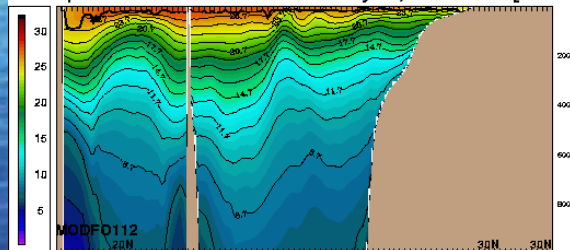


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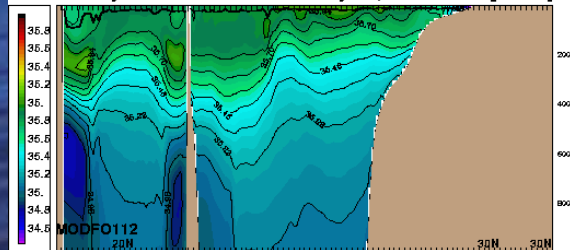


18 May 2000

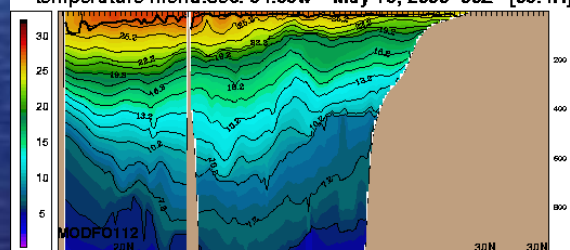
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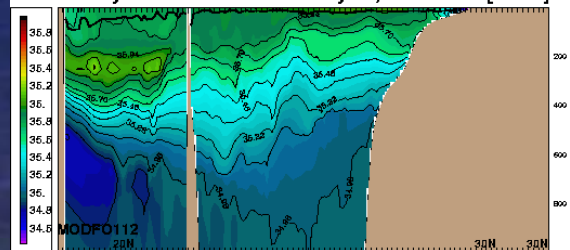
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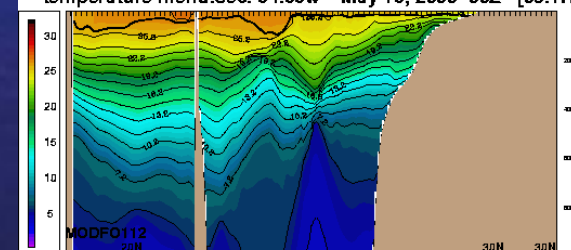
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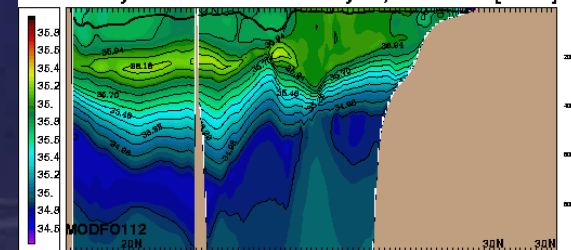
salinity merid.sec. 84.88w May 18, 2000 00Z [08.4H]



temperature merid.sec. 84.88w May 18, 2000 00Z [09.1H]



salinity merid.sec. 84.88w May 18, 2000 00Z [09.1H]



## *Future*

- New spin up of the Atlantic model
  - 5m coastline
  - $\sigma_2^*$
- Upgrade assimilation
  - NCODA